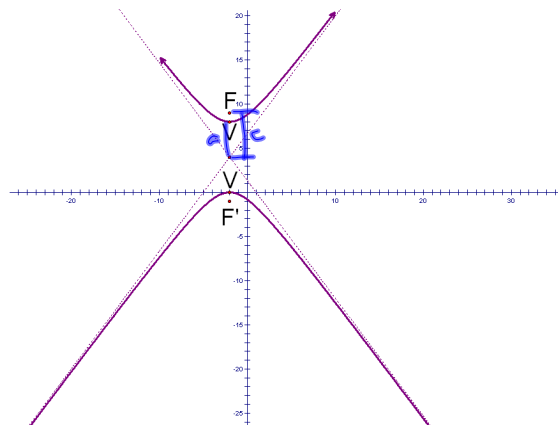


8.5 Hyperbolas

Hyperbola--the set of all points such that the absolute value of the difference of the distances from a point to two fixed points (foci) is a constant



gsp

Visual of construction

Focal radii--distances from the foci to a point P on the curve

Opens left/right

Opens up/down

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$

$$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$$

a is not necessarily the largest, but first.

a = distance from center to vertex

b =

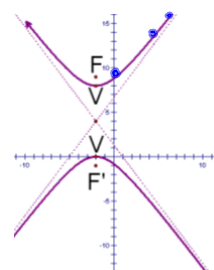
c = distance from center to each focus

Transverse axis--line segment of length 2a that intersects the hyperbola in 2 points (vertices)

Conjugate axis--perpendicular to transverse axis and has a length of 2b

$$a^2 + b^2 = c^2$$

asymptote--line such that the distance between this line and a point, P, on the graph goes to 0 as the distance between P and the center becomes greater and greater.



Equations of asymptotes

With a center of (0, 0).

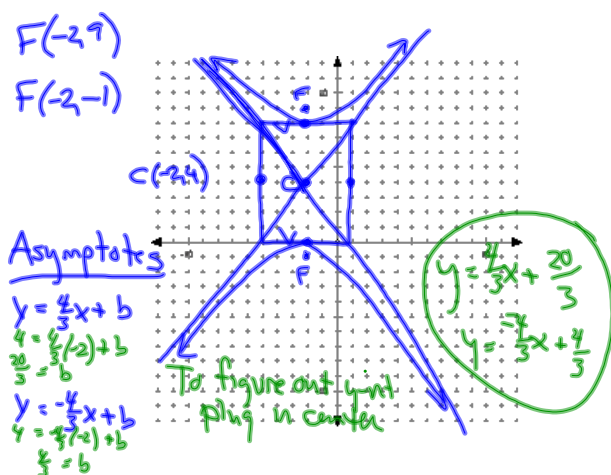
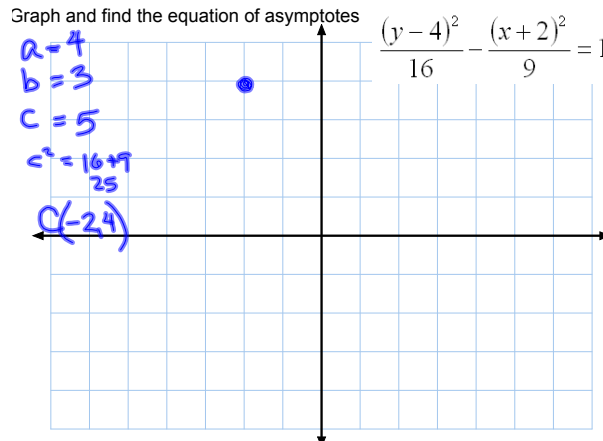
Left/Right

Up/Down

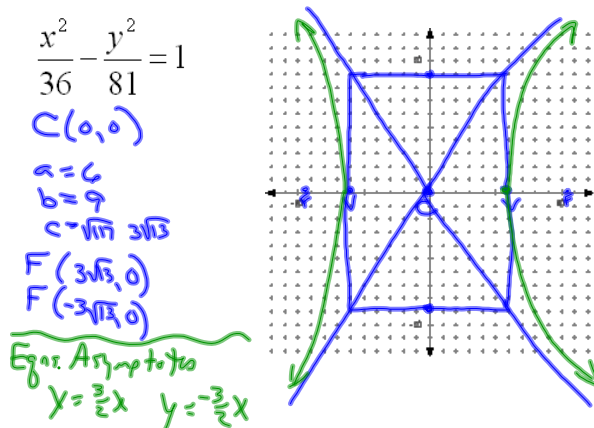
$$y = \frac{b}{a}x \quad y = -\frac{b}{a}x \quad \left| \quad y = \frac{a}{b}x \quad y = -\frac{a}{b}x$$

With a center of (h, k), the y-intercept is not zero, so you must figure it out.

Graph and find the equation of asymptotes



Graph and find the equation of asymptotes



Write the equation of a hyperbola with $C(0, 0)$.
Horizontal transverse axis, $a = 8$, $b = 5$

Write the equation of a hyperbola with $F(10, 0)$
and $F(-10, 0)$. $2a = 16$

$C(0,0)$
 $a=8$
 $c=10$

$$c^2 = a^2 + b^2$$

$$100 = 64 + b^2$$

$$36 = b^2$$

$$\frac{x^2}{64} - \frac{y^2}{36} = 1$$

Write the equation of a hyperbola with $V(1, -2)$
and $V(1, 2)$. $b = 2$

HW
p445-446
11-19odd, 23, 31, 33

Attachments

hyperbola_trans_sketch.gsp